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An Investigation of The Relationship Between Concept Formation and Rorschach Personality Measures

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AN INVESTIGATION OF THE RELATIONSHIPS BETWEEN CONCEPT
FORMATION AND RORSCHACH PERSONALITY MEASURES

being

A thesis presented to the Graduate Faculty
of the Fort Hays Kansas State College
in partial fulfillment of the requirements for
the Degree of Master of Science

by

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Date June 9, 1951

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INTRODUCTION

Related Studies

The experimental study of thinking is a field which has been seriously neglected by psychologists. When we compare the number of experimental studies on thinking with the amount of research done in other areas of learning, the extent to which this field has been neglected becomes apparent. We may legitimately ask why research in thinking is retarded and why such research is important. To keep in mind the specific problem of this thesis we might ask these questions with particular regard to the process of concept formation. In this introduction we shall discuss briefly the answers to these questions as they relate to our topic and shall mention various related studies which have been made.

There are undoubtedly several reasons for the general retardation of research on thinking. Many psychologists feel that the covert nature of the thought processes bars the use of modern experimental methods. Such processes, they feel, are best investigated by rather haphazard introspective techniques. A second reason for the backward status of research on thinking is the desire of many psychologists to investigate first the simpler activities of man before attempting

to investigate and analyze the more complex forms of behavior. (Underwood,4) Finally, a third explanation lies in the area of theory. The association theories of learning, which have for many years dominated research, have failed to ask stimulating and fruitful questions concerning thought processes. Associationistic doctrines have led to the investigation of many of the "mechanics" of thinking, but they have failed to ask questions concerning the more important problem of dynamical interaction between the personality of the individual as characterized by his strivings, affects, desires, and thought processes. With the rise of the different field theories in psychology the importance of recognizing the dynamic character of the thought processes has been established. There have been, however, practically no experimental studies done on the nature and extent of dynamic relationships in thinking.

Most of the evidence which we possess concerning thought processes in the human has been derived from studies in concept formation. Among the direct experimental studies those by Long and Welch, Heidebreder, Smoke, Hull, Kuo, and Reed stand out. The first two investigated the rate of concept formation as a function of the nature of the concepts to be attained. Smoke substituted geometric relationships for linguistic

stimuli and also formulated a good definition of a concept. Kuo demonstrated the superiority of linguistic response measurement to the introspective method in studying concept formation. Hull made elaborate quantitative studies of the efficiency of simple to complex versus complex to simple methods of forming concepts. Reed investigated the influence on concept formation of such factors as set, complexity of stimuli, and the method of presentation of the stimulus material. All of these studies have contributed much to our knowledge of the formal characteristics of thought processes but relatively little to our knowledge of the dynamical interaction between the personality of the individual and his thought processes. Without knowledge of both these areas a satisfactory theoretical structure to explain concept formation cannot be formulated.

Why should we study concept formation? To answer this we must first agree upon a definition of concept formation. Smoke (11) defines concept formation as forming a symbolic response to a given category. Rapaport (3) recognizes the role of symbolization but gives concept formation a somewhat broader interpretation when he states that it is a recognition of the relationship between ideas. He points out that concept formation

is all important in the development of language and in verbal thinking, and that it is also present in the development of religious and national beliefs and even in dreams. Such an interpretation of concept formation, if it is correct, makes obvious its indispensability in the successful interaction of the organism with the environment.

As further evidence for the importance of concept formation let us consider the results of the experiments of Goldstein with brain injury cases. From his studies of these cases Goldstein (1) hypothesizes the existence of a fundamental drive of the organism, called "self-actualization." "The organism has definite potentialities, and because it has them it has the need to actualize or realize them." The organism, however, cannot actualize all its potentialities at the same time. It's behavior must be governed by one need or capacity at a time. Here there are two possibilities. The organism may either passively yield to the configuration of the environment, or it may analyze the situation and choose for itself which activities to actualize. This latter possibility is what Goldstein calls the "abstract attitude." This attitude, which is essential to normal adult behavior, consists of being able "to break up a whole into given parts, to isolate and to synthesize them, to abstract common properties reflectively. . . to plan

ahead ideationally." A brief consideration of these characteristics reveals to us that without this abstract attitude we should be unable to engage successfully in any type of problem solving activity. It is apparent that the basis of the "abstract attitude" is the ability to form high-level concepts. Concept formation is seen to be one of the fundamental avenues through which forces of maladjustment impinge upon the organism's behavior.

In summary, we have considered the status of research on thinking and have pointed out that the importance of studying concept formation lies in the fact that it is essential to the satisfactory development and adjustment of the individual. We have outlined very briefly some of the outstanding experimental studies of concept formation. It was stated that these studies contributed very little to our knowledge of the dynamical relationships between thinking and personality. This area is the subject of the study to be reported in this paper. An even more important goal of this study is to stimulate research in this area and to help future investigators avoid some of the important methodological inadequacies uncovered by this preliminary study.

STATEMENT OF THE PROBLEM

Stated briefly, the problem is as follows: What are the relationships, if any exist, between concept formation and Rorschach measures of personality and intelligence? In selecting personality measures an effort was made to use those which, according to Rorschach theory, best describe the two main areas of personality, namely, the intellectual and the emotional areas. From these measures certain ones were selected as measures of intelligence. A further effort was made in the selection of these various measures to choose only those which have been well standardized with respect to both scoring and interpretation. The writer thus hoped to keep errors due to lack of experience to a minimum. Below is a list of the Rorschach measures which were selected and a brief interpretation of each.

Personality Measures Used

I. Intellectual

1. W%---- the extent to which the subject utilizes the whole blot in forming responses. This is supposed to be indicative of organizational ability and the subject's emphasis on abstract thinking.
2. D%---- the extent to which the subject utilizes the large, obvious details in forming responses. According to Rorschach theory this measures the subject's ability to see obvious details relevant to the solution of a problem.

3. W:D ratio----the ratio between the two above measures. This ratio is supposed to show how the individual distributes his efforts in attacking a problem.
4. P%---- the per cent of popular or common responses given by the subject. This is supposed to be a measure of the extent to which the subject thinks like the majority of the population.
5. A%---- the per cent of the subject's responses which are animal in content. This is presumably a measure of stereotypy in the subject's thinking.
6. H/A:Ad/Hd--- the ratio between the number of responses seen as whole humans or animals and the number seen as human or animal details. According to theory this ratio measures the subject's tendency to be intellectually critical.

II. Emotional

1. Sum C----a weighted total of the number of responses using color as a determinant. Sum C is thought to be indicative of the subject's affective output and symbolizes the nature of his emotional ties with reality.
2. M:C----the ratio between responses determined by movement and those utilizing color. This ratio is supposed to be a measure of emotional stability.
3. DV%----the per cent of responses in which the subject utilizes the chiaro-scuric qualities of the blot to get an impression of distance or diffusion. This measure presumably is indicative of the amount of anxiety present in the subject and how he handles it.

4. Fc%----the per cent of responses (exclusive of color responses) determined primarily by the form qualities of the ink blots. This is supposed to be a measure of repression in the subject.

III. Intellectual-Emotional

1. Reaction times--- these times include both the average initial response time and the average time per response and are indicative, according to Rorschach theory, of alertness or depression.
2. F%---- the per cent of responses determined by the form qualities of the blot. This is one of the main factors by which we try to judge the subject's inner control.
3. M%---the per cent of responses determined primarily by human movement in the blot. This is thought to be an important measure of drive, inner life, and self-adjustment.
4. W:M ratio--- the ratio between whole and movement responses. W:M is supposed to measure the relationship between the subject's ability and his drive.

IV. Measures of Intelligence

1. W%---a measure, according to Rorschach theory, of the subject's organizational ability.
2. F%---This is thought to measure inner control and the subject's contact with reality through his ability to perceive forms.
3. A%---This is supposed to be a measure of stereotypy in the subject's thinking.
4. M%---This supposedly measures intelligence by indicating the maturity and productivity of the subject's fantasy life.

COLLECTION OF DATA

Methods Used

The success of any investigation depends upon, among other things, a wise choice of methods. For the collection of concept formation data a method devised by Reed (10) was used. The advantages of this method have been set forth adequately by him in his introductory studies. For investigating personality characteristics the author has chosen the Rorschach Inkblot Test. It is one of the very few instruments in psychology that gives a valid picture of the dynamical organization of the personality. Let us now proceed to a detailed discussion of the methodology.

Concept Formation Data

The concept formation data used in this experiment has been taken from the study by Ellis (13) on the effects of hints on concept formation. The subjects used in this experiment were taken from elementary psychology classes at Fort Hays Kansas State College. They were divided into two matched groups, A and B, of twenty each on the basis of the Henmon-Nelson Intelligence Test scores. The materials for the experiment consisted of forty-two 3" x 5" cards. On each card were printed four words.

One of the words was a "key" word, belonging to a concept such as animal, vegetable, or tree, which was to be formed by the subject. Each concept was symbolized by a three-letter nonsense syllable which was printed on the back of the card. There were six concepts in all, each one appearing seven times in the set of cards. The procedure for the experiment was thus: Each subject was read a set of directions which explained the nature of the experiment and the task of the subject. The examiner then presented the cards to the subject at the rate of one every seven seconds. If the subject called out the name of the card correctly, the examiner said, "Correct." If the subject was unable to give the correct name, the examiner prompted him. At the end of the second trial each subject was given a hint. Those subjects in group B were given a specific hint, while those in group A were given a non-specific hint. Concept formation ability was measured by the average number of promptings per concept necessary for a subject to learn the names of all the cards. Statistical comparisons utilized by the writer in this experiment are on the basis of forty subjects without regard to the sub-groups.

One week after the initial concept formation test was given, the subject returned, and his retention of the concepts was tested. At that time the Rorschach Inkblot Test was administered to him.

TABLE I

CORRELATIONS OF RORSCHACH PERSONALITY MEASURES WITH
PROMPTING AND INTELLIGENCE TEST SCORES AND
THE PROBABILITIES THAT SUCH CORRELATIONS
ARE ENTIRELY EXPLAINABLE ON THE BASIS
OF SAMPLING ERRORS

Personality Measures	Correlations with prompting scores	P*	Correlations with H-N Intelligence Scores	P*
W%	.04		-.19	.22
A ₇₀	-.17	.29	-.41	<.01
F%	-.08		-.44	<.01
M%	-.07		.51	<.01
ΣC	.24	.11	.34	.016
D%	.21	.20		
DV%	-.10			
Fc%	.10			
Rpr.%	-.03			
P%	-.22	.19		
W:D	.11			
W:M	.11			
M:C	-.51	<.01		
H/A:Hd/Ad	.19	.22		
T	.22	.19		
t	.25	.10		

* P represents the probability that the correlation can be entirely explained on the basis of sampling errors.

QUANTITATIVE RESULTS

Evaluation

The foregoing table presents the statistical findings of this experiment. The value required of r for significance at the .01 level of confidence is .34, and for significance at the .05 level of confidence the value required is .32.

This table shows us that the following personality measures have no significant correlation with concept formation ability: $W\%$, $A\%$, $M\%$, $F\%$, $D\%$, $DV\%$, $Fc\%$, $Rpr.\%$, $P\%$, $W:D$, $W:M$, $H/A:Hd/Ad$, and T . Sum C and t show slight positive correlations with concept formation. The $M:C$ ratio shows a large negative correlation with concept formation. Let us examine these last three measures interpretatively.

Sum C, the weighted sum of the color responses, correlates .24 with concept formation and is supposedly indicative of the total affective output of a subject. The probability that this correlation represents a true deviation from zero is .89. Sum C may be broken down into three types of color responses: (1) those in which there is a fusion of form and color (2) those in which the color is dominant over the form (3) those which are dependent solely upon color. The first type represents

good emotional control and stability, and the complete fusion of form and color requires a high type of intelligence. The last two types represent emotional impulsiveness and instability. In the records of the subjects used in this experiment the FC type of color responses considerably outweighs the CF and C types of responses. This distribution of color responses explains the statistical relationship. Concept formation is correlated with good emotional control.

Average initial reaction time (t) correlates .25 with concept formation. The reliability of this correlation coefficient is the same as the one discussed above. According to Rorschach theory, a short t represents mental alertness, which presumably would be a help in problem solving. If so, we can easily see why t correlates positively with concept formation.

The M:C (movement to color) ratio is, according to theory, a measure of the relationship between the subjects introversive and extroversive tendencies. M represents introversive tendencies and C extroversive. The larger the ratio, then, the more introversive the subject. The correlation of -.51 which we found between M:C and concept formation is statistically significant, occurring as a result of sampling errors less than one in 100 times. A possible interpretation of this

relationship is that the intellectual energies of introverts are directed inward, thus rendering the individual less capable than an extrovert of solving objective problems in the world of reality.

Our table also shows us that $M\%$, whole responses, is not related to intelligence. $M\%$ and Sum C both show high positive correlations with intelligence. $F\%$ and $A\%$ show high negative correlations with intelligence.

The correlations which have been computed between personality measures and intelligence are, for the most part, much larger than those between personality measures and measures of concept formation. A possible explanation of this is that intelligence is more dependent than concept formation upon the amount of intellectual energy available to the subject and less dependent upon the organization of this energy with respect to the total personality. The above measures of personality are, of course, measures of amount and are not descriptive of the personality configuration. The measures which correlated significantly with intelligence test scores are $M\%$, $F\%$, Sum C, and $A\%$.

Theoretically, $M\%$ is closely allied to the maturity of an individual and to the development of his inner control. In interpreting Rorschach records the interpreter must use this score extensively in

describing the intellectual level of the subject. Our statistical findings support this interpretation of M very well. The chances that a positive correlation actually exists are better than 99 in 100.

F% (form responses), according to Rorschach theory, is a measure of both inner control and of the subject's contact with reality. The significant negative correlation which was found between F% and intelligence would seem to be opposed to this interpretation. This is not actually the case. Form responses are by far the easiest responses to make, and the quality of the form response is not figured in computing the F%. Intelligent subjects are able to use other determinants as well as form in giving responses. Unintelligent subjects, on the other hand, give very few responses other than crude form responses. Thus, a high F% (one over sixty) is indicative not of excellent contact with reality, but rather of limited intellectual powers. If this is true, the negative correlation is very plausible.

The interpretation of Sum C has already been discussed. It is interesting to note that this measure correlates more highly with intelligence than with concept formation. This is easily understandable, because intelligence is only one requirement of good concept formation ability. Concentration and perseverance

are also necessary qualities. It has already been pointed out that good color responses require a higher type of intelligence than do crude form responses.

A% (animal responses), which correlates $-.41$ with intelligence, supports the Rorschach theory for this measure. Presumably A% is a measure of stereotypy in thinking. High A% indicates suggestibility and lack of independence in a subject's thinking. It is only reasonable to assume that these qualities are associated more often with lower intelligence than with average or superior intelligence.

W%, whole responses, correlates $-.19$ with intelligence. This correlation is not large enough to assume with any certainty the existence of a real relationship. The very absence of a relationship between W% and intelligence is diametrically opposed to Rorschach theory. Theoretically the W score represents the organizational ability of the subject and is correlated very highly with intelligence. Reasons for the absence of this relationship in our investigation will be discussed later.

Having now considered our statistical findings let us see how they relate to the solution of the problem reported in this paper. To reiterate, the problem in which we are interested is the investigation of relationships between personality characteristics and concept formation and between personality characteristics

and intelligence. On the basis of our correlations, we can assume that relationships exist between concept formation and the personality measures Sum C, M:C, and average initial reaction time (t). Relationships can be assumed between intelligence and the personality measures A%, F%, M%, and Sum C. Contrary to theory, no relationship was found between intelligence and W%. The interpretation of these various relationships has already been discussed. Let us now proceed to a discussion of some of the possible explanations for the absence of significant correlations between personality measures and concept formation.

Reasons for Results

When we examine the foregoing data, we find that only one of the correlations between the various personality measures and the average promptings per concept reached the required value for significance at the .05 level of confidence. If, as was stated earlier, we have every reason to believe that a relationship exists between an individual's thought processes and his personality, then why do we find such low correlations? There are several explanations for this, any one or all of which may be correct.

Firstly, the quantification of the Rorschach material is probably too coarse. Let us consider, for example, the W or whole score of an individual. This score is based on the subject's number of responses which utilize the whole ink blot. There are three main categories of W responses, namely $W\frac{1}{2}$, W, and W-. These categories stand respectively for excellent, average, or arbitrary whole responses. As a general rule, W- responses are found only in severely neurotic or psychotic patients. None of the subjects used in this experiment gave such responses. All of the W responses, regardless of quality are summed together when computing the $W\%$. Obviously, however, not all whole responses represent equal amounts of organizational ability. Quite to the contrary, some whole responses indicate the absence of organizational ability and represent only a felt need to organize situations. This unsatisfactory quantification is true not only of W responses but of all other scores as well. The tendency of such quantifications to lower correlations is easily imaginable.

A second cause of the low correlations might well be the attempt to isolate personality characteristics. Although such isolation greatly facilitates statistical treatment of data, we must not forget that each personality characteristic is inseparable from the total

personality and in operation is dependent upon the total configuration of the personality and the environment. This idea has been emphasized again and again by all the field theorists and is especially predominant in the experiments and writings of Goldstein, to whom we have already referred. As a corollary to this consideration we must realize that every personality measure has a unique interpretation. To illustrate, the presence of five movement responses has as many different interpretations as the number of records in which the responses are found. The same is true of all other measures. Each must be interpreted with respect to the total personality configuration. At present there are no statistical methods which are adaptable to the treatment of configurations.

A third contributing reason for our statistical findings is the fact that the individual inhibiting or enhancing effect of any given personality measure upon concept formation depends not upon its absolute size but upon its proximity to the ideal value of that measure. Again, this ideal value varies for each individual. Thus, if the obtained value of a measure is far from the ideal value for that measure, the effect upon concept formation and general efficiency will probably be inhibitory, regardless of the direction of the deviation.

Our correlations, however, are dependent upon the absolute value of a measure rather than upon the size and direction of its deviation from the ideal value.

A fourth factor which undoubtedly tended to lower the correlations is the nature of the group tested. All were college students and hence represented only a very small range of intelligence. It has often been demonstrated that the homogeneity of a sample is inversely related to the size of coefficients involving the sample.

A fifth and final explanation of our results concerns our test of concept formation. Any single test of concept formation is necessarily limited in validity. This is especially true of verbal concept formation tests. As Rapaport (3) aptly points out, a verbal concept formation test often masks rather than reveals maladjustments. This criticism, however, probably pertains less to our test of concept formation than to concept formation tests such as the Similarities Test on the Wechsler-Bellvue Intelligence Scale.

SUGGESTIONS FOR FUTURE RESEARCH

Mere enumeration of the inadequacies of an experimental method is of quite limited value unless we can use this knowledge to avoid or compensate for these

inadequacies in future research. In the writer's opinion future researches of this type should be modified in two main areas.

Quantification and Statistical Evaluation of Personality Data

One area is that of quantification and statistical evaluation of personality data. With respect to quantification the major Rorschach scoring systems provide for a three-fold classification of each area and determinant. This classification as it is used in the W score has already been discussed. Rapaport (3) has demonstrated the utility of a four-fold classification of the determinant F (form). This classification is as follows:

1. F~~/~~ --- sharply and accurately delineated forms.
2. F --- form responses which are essentially good but which have some bad characteristics.
3. F --- form responses which are essentially poor but which have some redeeming qualities
4. F- --- Arbitrary form responses

If we use the first two categories of this classification to figure an F%, we should be able to reverse the sign of the correlation coefficient found between intelligence and the F% based on the total number of F's. This system could, with some modification, be expanded

to include the other determinants. It could also be used to advantage in evaluating the W responses of a subject. In this latter case we could, using this system, separate those W responses showing good organizational ability from those indicating merely average or even poor ability. This same advantage is present in evaluating the quality and significance of the different determinants.

The advantages of this system would, no doubt, be more fully utilized by employing multiple and partial correlations rather than correlations of zero order. Such correlations would partially solve the problem created by isolating personality characteristics. The author is by no means suggesting, however, that a total personality is equal to a simple summation of its individual characteristics.

The basis for another expanded scoring scheme is given us by Klopfer and Kelley (2) in their discussion of the various procedures used by subjects in arriving at W responses. This scheme is not, however, particularly suited for normal records and is therefore less satisfactory for research such as is reported in this paper than the one outlined by Rapaport.

Enlargement of Range of Concept Formation Testing

The second area in which future projects of this type should be modified is the range of concept formation testing. We can test concept formation on three principal levels: the verbal level, the performance level, and the reality level. By this last level is meant the manner in which the subject deals with actual objects in the world of reality. Maladjustment in concept formation ability may manifest itself at one level without being apparent at other levels. It is therefore essential that we test as wide a range of concept formation ability as possible. Statistical handling of concept formation ability would be greatly facilitated were we able to give a composite score based on the configuration of a number of different tests. Unfortunately, our present knowledge does not permit us to do this.

In addition to expanding the testing of concept formation, research psychologists might do well to undertake an analysis and classification of errors made on concept formation tests. Such an analysis should point to the causal features in the personality and might thus increase our knowledge of personality-concept formation relationships.

It should be realized that the above suggestions, although they may point the way to necessary methodological improvements, do not solve the central problem inherent in the investigation of relationships between personality and concept formation. This problem is that of statistically comparing the total personality configuration with the total configuration of concept formation ability. Much more research is necessary, both in the area of statistics and in the area of personality, before this problem can be solved.

SUMMARY

To summarize, the author has tried to present in this paper reliable statistical evidence for the existence of relationships between Rorschach personality measures and concept formation and between those measures and intelligence. The attempt was only partially successful. Significant correlations were found between concept formation ability and the personality measures Sum C (color), M:C (movement to color), and t (average initial reaction time). No relationships were found to exist between concept formation and the following Rorschach personality measures: W% (whole responses), A% (Animal responses), F% (form), M% (movement), D% (large details), DV% (Diffusion Vista), Fc% (texture), Rpr % (repression % calculated from form responses, exclusive of color), P%

(Popular responses), W:D (whole to large detail ratio), W:M (whole to movement ratio), H/A: Hd/Ad (Human and animal wholes to human and animal details), and T (average response time). Significant relationships were found between intelligence test scores and the personality measures M% (Movement), F% (form), Sum C (color), and A% (animal). No relationship was found between intelligence and W% (whole). An explanation for this which was suggested was that quantification of the W% was too coarse.

An attempt was also made to point out the more important methodological difficulties which, during the course of the investigation, became apparent. These difficulties discussed were: coarse quantification of Rorschach data, isolation of personality characteristics, basing correlations on amounts of the various characteristics present rather than upon the deviations of these amounts from ideal values, narrow range of subjects, and limited validity of concept formation test. Suggestions were made for overcoming these difficulties. These suggestions were: use an expanded system of scoring Rorschach tests, expand the concept formation testing, undertake an analysis and classification of errors made on concept formation tests. The central problem of

such an investigation as this was then formulated. This problem involved the statistical handling of personality and concept formation ability configurations. The necessity of much more research in the areas of personality and statistics was emphasized.

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